Si886xxISO-EVB User's Guide

Description

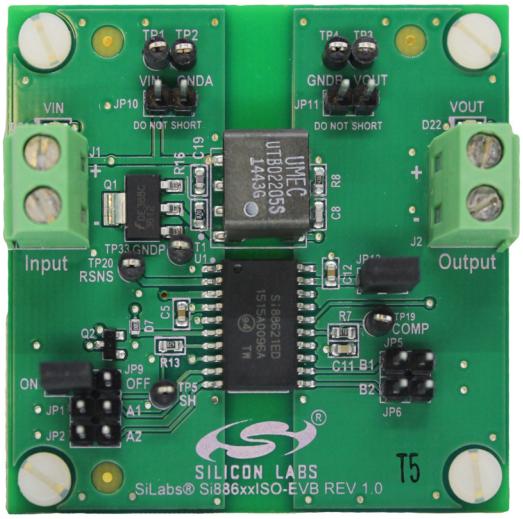
This document describes the operation of the Si886xxISO-EVB.

Kit Contents

The Si886xxISO Evaluation Kit contains the following items:

- Si886xxISO-EVB
- Si88621ED-IS installed on the evaluation board.

Si886xxISO-EVB Overview



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1. Hardware Overview and Setup

The default configuration of the Si886xxISO-EVB demonstrates the digital isolation capabilities of the installed Si88621ED-IS as well as its dc-dc converter performance. In this configuration, the dc-dc converter is enabled, the primary side digital supply is sourced by an external regulator circuit, and the secondary side digital supply is sourced by the output of the converter. This EVB configuration has a jumper installed at JP9 in the ON position, JP13 has a jumper installed, and the remaining jumpers not populated.

Note: Do not place jumpers across JP10 or JP11. These are additional test points for VDDA, GNDA and GNDB, and VOUT respectively.

1.1. DC-DC Converter Input and Output

Supply power to the EVB by applying 24 Vdc to VIN at terminal block J1. LED D21 above terminal block J1 illuminates to show power applied to primary side of the converter.

The isolated dc-dc output, VOUT, is available at terminal block J2. The populated values for R5 and R6 produce a 5 V output at VOUT capable of sourcing up to 5 W to an external load connected to terminal block J2. LED D22 above the terminal block J2 illuminates when the dc-dc converter is operating.

VIN and VOUT test points are available along the upper edge of the EVB.

1.2. Digital Isolator Supplies

The A-side power is provided by a regulator circuit referenced to VREGA pin of the Si888621ED-IS. VIN is stepped down from 24 V to approximately 4.3 V and applied to VDDA pin.

The B-side power is supplied by the output of the dc-dc converter through JP13.

1.3. Digital Signals

The EVB has a series of header pins for connecting to each digital channel. The inside conductor of each 2x1 header is connected to the device pin and the outer conductor is tied to ground through a resistor of 499 Ω. Connect digital signals to each side of the Si886xxISO-EVB through a two-row ribbon cable with one row grounded.

- Channel 1 transmits from A1 (JP1 pin 2) to B1 (JP4 pin 1).
- Channel 2 transmits from B2 (JP5 pin 1) to A2 (JP2 pin 2).

Note: The digital input signal should not exceed the power supply of the respective side.

1.4. Transformer Current Sensing

Primary side magnetizing current across the sense resistor R12, can be observed by probing TP20, RSNS with reference to TP33, GNDP.

2. Alternative Configurations

2.1. Disabling the DC-DC Converter

The SH_FC input (U1 pin 7) disables the dc-dc converter. JP9 controls the SH_FC input, enabling the converter when pulled low, ON, and disabling the converter when pulled high, OFF. To disable the dc-dc converter, place the jumper in the OFF position on JP9.

If interfacing to an external controller through the JP9 header, the controller must drive SH low for normal operation and high to disable the dc-dc.

Note: When the dc-dc converter is disabled, the B-side can be powered by an active high digital input on the B-side. Ensure B2 input is tri-state or driven low when VDDB is left floating or grounded.

2.2. 3.3 V DC-DC Converter Output

To change VOUT to 3.3 V, change R5 to 43.2 kΩ and R6 to 20.0 kΩ.

2.3. Alternate Supply for VDDA

To bypass the regulator circuit and supply VDDA from a separate supply, remove Q2 and connect positive power supply through JP9 pin 3 and connect the supply return to J1 pin 2.

2.4. Alternate Supply for VDDB

To supply VDDB from a separate supply, remove the jumper on JP13 and supply desired power through JP13 pin 2 and connect the supply return to J2 pin 1.

3. Quick Reference Tables

Table 1. Test Point Descriptions

Test Point	Description	Referenced to
TP1	VIN	GNDA/GNDP
TP2	GNDA/GNDP	N/A
TP3	VOUT	GNDB
TP4	GNDB	N/A
TP5	SHDN	GNDA/GNDP
TP19	COMP	GNDB
TP20	RSNS	GNDA/GNDP
TP33	GNDP	N/A

Table 2. Jumper Descriptions

Jumper	PIN 1*	PIN 2*	PIN 3*	Default Position	Description
JP1	GNDA (through 499 Ω)	A1	—	Not Installed	Digital Isolator Connector
JP2	GNDA (through 499 Ω)	A2	—	Not Installed	Digital Isolator Connector
JP5	B1	GNDB (through 499 Ω)	—	Not Installed	Digital Isolator Connector
JP6	B2	GNDB (through 499 Ω)	—	Not Installed	Digital Isolator Connector
JP9	GNDA	SHDN	VDDA	Installed (SHDN - GNDA)	DC-DC Converter Enabled
JP10	VIN	GNDA	—	Not Installed	**DO NOT SHORT – test points only**
JP11	GNDB	VOUT	—	Not Installed	**DO NOT SHORT – test points only**
JP13	VDDB	VOUT	—	Installed	Connects VDDB to VOUT
***Note:** Pin numbering is from left to right.					

4. Si886xxISO-EVB Schematics

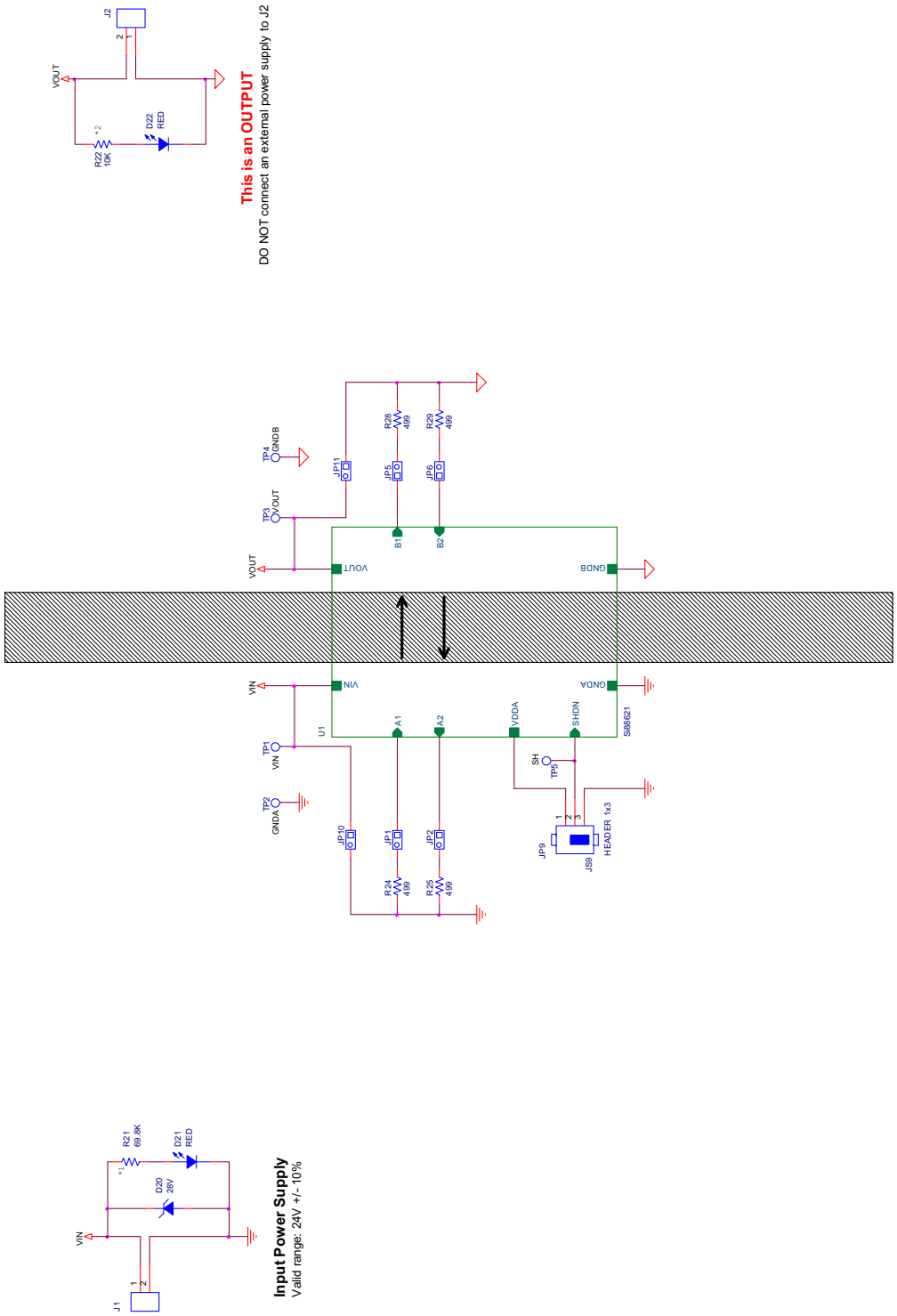

Figure 1. Si886xxISO-EVB Schematic (1 of 2)

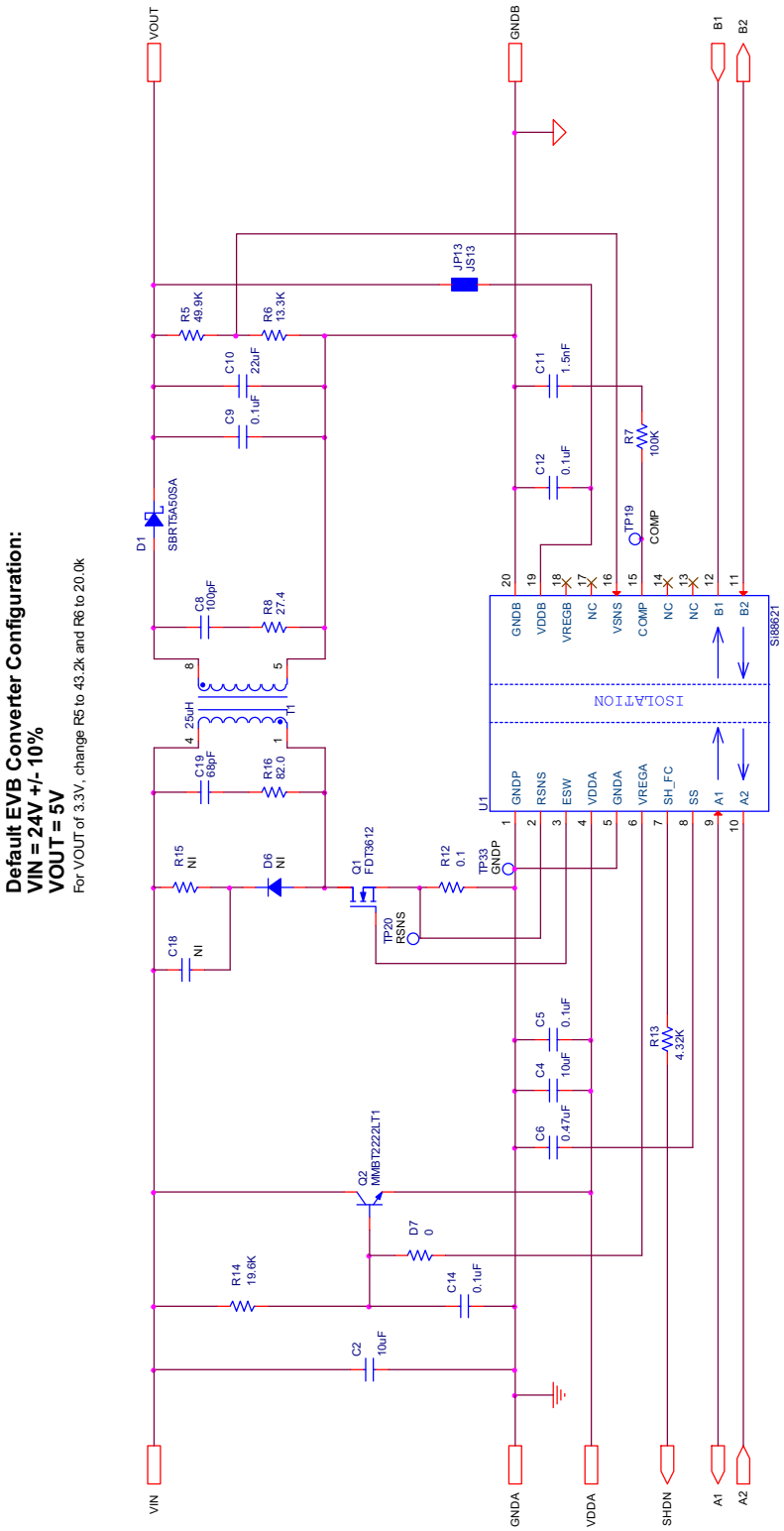

Figure 2. Si886xxISO-EVB Schematic (2 of 2)

5. Si886xxISO-EVB Layout

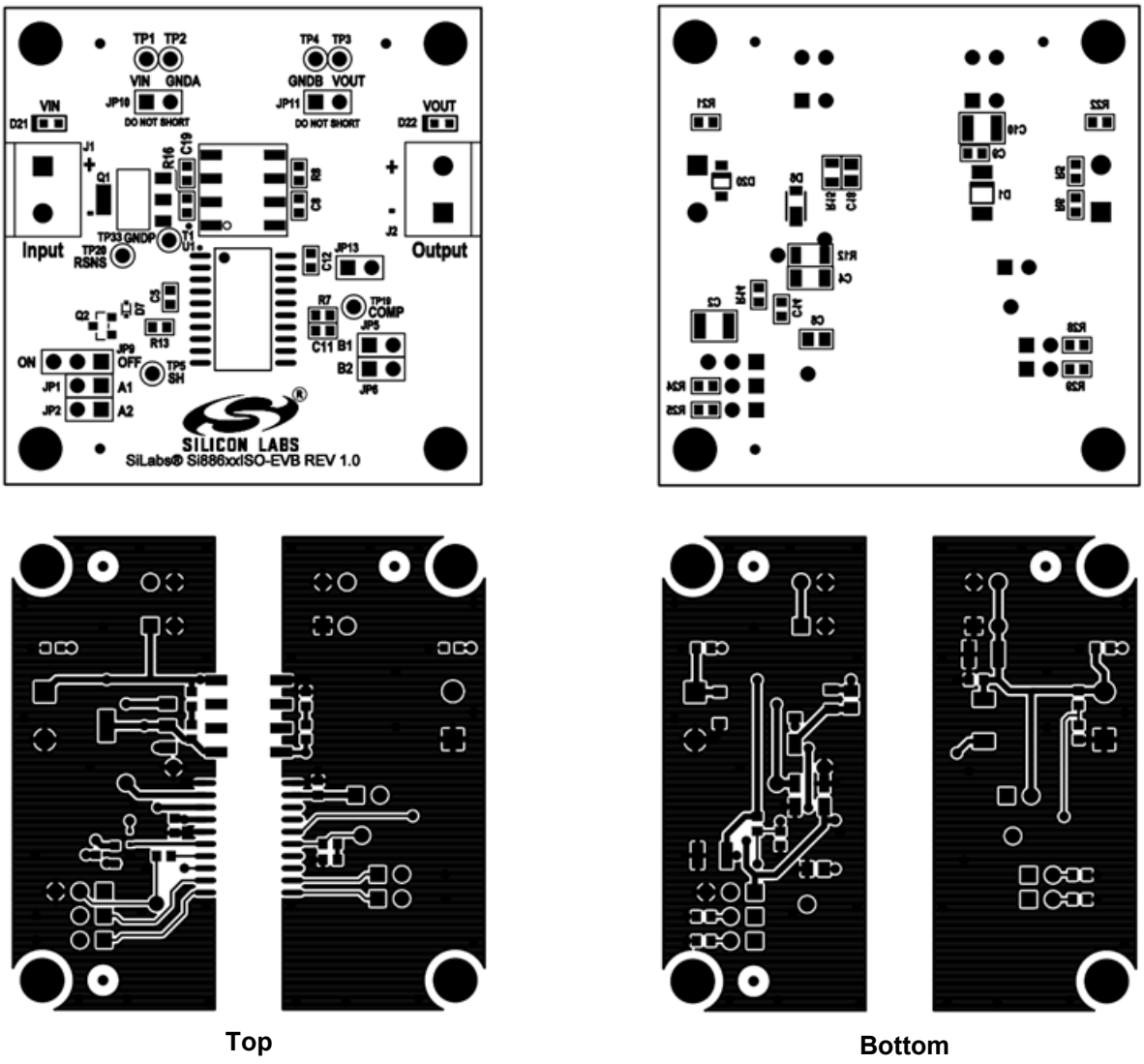

Figure 3. Si886xxISO-EVB Layout

6. Bill of Materials

Table 3. Si886xxISO-EVB Bill of Materials

Part Reference	Description	Manufacturer	Manufacturer Part Number
C2	CAP, 10 µF, 50 V, ±20%, X7R, 1210	Venkel	C1210X7R500-106M
C4	CAP, 10 µF, 10 V, ±20%, X7R, 1206	Venkel	C1206X7R100-106M
C5 C9 C12 C14	CAP, 0.1 µF, 10 V, ±10%, X7R, 0603	Venkel	C0603X7R100-104K
C6	CAP, 0.47 µF, 16 V, ±10%, X7R, 0805	Venkel	C0805X7R160-474K
C8	CAP, 100 pF, 50 V, ±10%, X7R, 0603	Venkel	C0603X7R500-101K
C10	CAP, 22 µF, 25 V, ±10%, X7R, 1210	Venkel	C1210X7R250-226M
C11	CAP, 1.5 nF, 25 V, ±10%, X5R, 0603	Venkel	C0603X5R250-152K
C18	CAP, 0.047 µF, 100 V, ±10%, X7R, 0805	Venkel	C0805X7R101-473K
C19	CAP, 68 pF, 100 V, ±10%, C0G, 0603	Venkel	C0603C0G101-680K
D1	DIO, SUPER BARRIER, 50 V, 5.0A, SMA	Diodes Inc.	SBRT5A50SA
D6	DIO, FAST, 200 V, 1.0A, PowerDI-123	Diodes Inc.	DFLU1200-7
D7	RES, 0 Ω 1A, ThickFilm, 0603	Venkel	CR0603-16W-000
D20	DIO, ZENER, 28 V, 500 mW, SOD123	On Semi	MMSZ5255BT1G
D21 D22	LED, RED, 631 nM, 20 mA, 2 V, 54mcd, 0603	Lite-On	LTST-C190KRKT
J1 J2	CONN, TERM BLOCK 2POS, 5MM PCB	Phoenix Contact	1729018
JP1 JP2 JP5 JP6 JP10 JP11 JP13	Header, 2x1, 0.1” pitch, Tin Plated	Samtec	TSW-102-07-T-S
JP9	Header, 3x1, 0.1” pitch, Tin Plated	Samtec	TSW-103-07-T-S
JS9 JS13	Shunt, 1x2, 0.1” pitch, Tin plating	Samtec	SNT-100-BK-T
MH1 MH2 MH3 MH4	HDW, Screw, 4-40 x 1/4" Pan Head, Slotted, Nylon	Richco Plastic Co	NSS-4-4-01
Q1	TRANSISTOR, MOSFET, N-CHNL, 100 V, 3.7A, 3W, Switching, SOT223	Fairchild	FDT3612
Q2	TRANSISTOR, NPN, 30 V, 600 mA, SOT23	On Semi	MMBT2222LT1
R5	RES, 49.9K, 1/16W, ±1%, ThickFilm, 0603	Venkel	CR0603-16W-4992F
R6	RES, 13.3K, 1/16W, ±1%, ThickFilm, 0603	Venkel	CR0603-16W-1332F
R7	RES, 100K, 1/10W, ±1%, ThickFilm, 0603	Venkel	CR0603-10W-1003F
R8	RES, 27.4 Ω,1/10W, ±1%, ThickFilm, 0603	Venkel	CR0603-10W-27R4F
R12	RES, 0.1 Ω, 1/2W, ±1%, ThickFilm, 1206	Venkel	LCR1206-R100F
R13	RES, 4.32K, 1/10W, ±1%, ThickFilm, 0603	Venkel	CR0603-10W-4321F
R14	RES, 19.6K, 1/16W, ±1%, ThickFilm, 0603	Venkel	CR0603-16W-1962F

Table 3. Si886xxISO-EVB Bill of Materials

Part Reference	Description	Manufacturer	Manufacturer Part Number
R15	RES, 10K, 1/10W, ±1%, ThickFilm, 0805	Venkel	CR0805-10W-1002F
R16	RES, 82.0 Ω, 1/10W, ±1%, ThickFilm, 0603	Venkel	CR0603-10W-82R0F
R21	RES, 69.8K, 1/16W, ±1%, ThickFilm, 0603	Venkel	CR0603-16W-6982F
R22	RES, 10K, 1/10W, ±5%, ThickFilm, 0603	Venkel	CR0603-10W-103J
R24 R25 R28 R29	RES, 499 Ω, 1/10W, ±1%, ThickFilm, 0603	Venkel	CR0603-10W-4990F
SO1 SO2 SO3 SO4	HDW, STANDOFF, 1/4" HEX, 4-40x3/4", NYLON	Keystone	1902D
T1	TRANSFORMER, Flyback, 25 µH Primary, 500 nH Leakage, 3:1, SMT	UMEC	UTB02205s
TP1 TP2 TP3 TP4 TP5 TP19 TP20 TP33	TESTPOINT, BLACK, PTH	Kobiconn	151-203-RC
U1	IC, ISOLATOR, DC-DC External Switch, Freq Control, 2 Digital Ch, SO20 WB	Silicon Labs	Si88621ED-IS

7. Si886xxISO-EVB Ordering Guide

Table 4. Si886xxISO-EVB Ordering Guide

Ordering Part Number (OPN)	Description
Si886xxISO-KIT	Si886xx dc-dc digital isolator evaluation board kit

Contact Information

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